1. Identify each of the following equations as either linear, quadratic or exponential.

   a. $y = 3x$
   b. $y = 3^x$
   c. $y = 3x^2$
   d. $y = -0.75^x$
   e. $y = -0.75x$
   f. $y = -0.75x^2 + 2$
   g. $y = x^2 + 5$
   h. $y = 16^x$

2. Simplify each of the following expressions and express your final answers using only positive exponents. Decimal equivalents will not be accepted.

   a. $(3x^5)(2x^{-2})$
   b. $\dfrac{x^7 y^3 z}{x^9 y^3 z^4}$
   c. $\dfrac{65a^7 b^6 c^{-4}}{-5a^2 b^{-3} c}$
   d. $(2a^{-3}b^2)^3$
   e. $(-2a^{-3}b^3c)^{-5}$

3. For each of the following situations, identify the relation as linear, quadratic or exponential.

   a. Larry is paid $10 per hour, he receives a $1 per hour raise each year.
   b. A painting was bought for $475. Each year its value increases by 8%.
   c. A principal of $500 is invested at 5% simple interest for 20 years.
   d. A ball is kicked from the ground. At 1 second it is 3 m off the ground. At 2 seconds it is 12 m off the ground, at 3 seconds it is 27 m off the ground.
   e. Actinium has a half life of 5 years.
   f. The population of Estonia is 3.75 million. It increases at a rate of 1.3% each year.
   g. The temperature of the Sahara desert is 35^{o}C always.
   h. A bouncing ball rebounds to ¾ of it's height on each bounce of the ball. The ball was dropped from a height of 45 meters.
   i. A colony of bacteria triples every 10 minutes. Initially there were 20 cells in the colony.

4. For each exponential relation in question 3, write an equation for the situation and state whether it represents exponential growth or exponential decay.

5. How much will the painting be worth after 7 years?

6. After 1 hour, how many bacteria will be present in the colony?

7. After 3 bounces, how high is the ball?

8. What percentage of the Actinium remains after 50 years?

9. What will the population of Estonia be in 15 years?

10. The value of a car can be represented by the equation $V = 6200(0.915)^x$, where x is in years.

    a. What was the initial value of the car?
    b. What is the rate of depreciation per year (as a percentage)?
    c. Does this model exponential growth or exponential decay?

11. The value of an investment with compound interest can be represented by the equation, $A = 500(1.075)^n$, where n is in years.

    a. What was the initial value of the investment?
    b. What is the rate of return on the investment per year as a percent?
    c. Does this model exponential growth or exponential decay?

12. Convert the following growth rates to a growth factor (b).

    a. 7 %
    b. 80 %
    c. 0.58 %
    d. 3.14 %

13. Convert the following growth factors to growth rates.

    a. 1.03
    b. 1.72
    c. 1.0075
    d. 1.006

14. Convert the following decay rates to a decay factor (b).

    a. 5%
    b. 50%
    c. 85%
    d. 7.5%

15. Convert the following decay factors to a decay rate

    a. 0.75
    b. 0.085
    c. 0.005
    d. 0.03